# Comments on "Competition Between Fractional Quantum Hall Liquid ..., by G. Gervais, L. W. Engel, H. L. Stormer, D. C. Tsui, et al cond-mat/0402169(5 Feb. 2004)".

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The quantum Hall effect in ultra-high mobility GaAs/AlGaAs has been measured and plateaus are found at many different fractions. The resistivity is quantized as $\rho = h/ie^2$ where $i$ exhibits many different values. The fractions 5/3, 8/5, 11/7, 14/9 and 17/11 fit the formula $3p \pm 2/(2p \pm 1)$ and it is claimed that $2p$ flux quanta are attached to the electron. The fractions 4/11, 7/11, 12/7, 13/8, 15/11 do not fit the expression for $i$, even then the authors insist that flux quanta are attached to the electron and hence composite fermions are formed. We report that the interpretation of the experimental data in terms of CF is incorrect.

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## 1. Introduction

It has been suggested that flux quanta $\phi = hc/e$ exist as independent particles which can be attached to the electron to form a bound state consisting of even number of flux quanta and an electron. These composite fermions (CF) might be searched in the data of quantum Hall effect where fractionally charged particles may exist. The magnetic field is produced by currents so that fields and currents both must occur. The theory of such CF could not be formulated consistently but there is ambition to discover new theories and new principles. In spite of several years of work and drum beating, the theory of CF is not yet known. When the theory itself is

not known, it is not possible to see CF in the experimental data. It has been informed many times[1] that "CF" does not exist and the experimentalists should refrain from making claims that they have observed CF but new students keep coming and they read the earlier papers and say that they have observed the CF. Therefore, it is being asked in the APS meeting that a suitable "retraction" should be issued and it should be announced clearly that CF have not been observed. In this comment we point out that the claim of Gervais et al[2] that they observed any CF is false.

## 2. Gervais et al

Gervais et al say that CF has been observed in N=0 and N=1 Landau levels. The observation of a series $i = 3p \pm 2/(2p + 1)$ is a phenomenology to churn the numbers. Even if this series is successful in getting the experimental fraction, it does not mean that "flux is attached to the electron". The numbers 4/11 and 7/11 could not be obtained from the CF series, even then the authors insist that there are CF. When every thing has been done to say that CF are inconsistent, the Columbia-Princeton authors continue to say that there are CF. When the numbers 5/2 and 7/2 could not be explained, they started saying that CF are paired. The fractions 5/3, 8/5, 11/7, 14/9, 17/11 fit the expression $3p \pm 2/(2p + 1)$ but 12/7, 13/8, 15/11 do not fit. So whether they fit or not either way the claim is made that CF are observed. Even if the series gives some fractions correctly it does not prove that fluxex are attached. The fractions 21/5 and 24/5 are also found in the experimental data but now Gervais et al suggest that incompressible Laughlin[3, 4] liquid may be formed. Now there is no need of CF but whether Laughlin is relevant to the data or not is yet another question. **3. Conclusions**. In conclusion, the interpretation of the experimental data given by Gervais et al in terms of CF(flux-attached quasi-particles) is incorrect. There are more than 148 fractional charges found in the data, so there is no chance for attaching fluxes to electrons without appropriate currents. Hence the CF model

is wrong.

The correct interpretation of Stormer's data[5] is given by us[6-17].

## 4. References

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